WHAT IS CLAIMED IS:

1. An internal combustion engine comprising:

a fuel system that applies injection control pressure (ICP) to fuel injectors to force fuel into combustion chambers; and

a control system for setting ICP in accordance with data developed by a processor of the control system wherein,

the control system comprises a map that provides a schedule that correlates data values of closed-loop gain with data values for certain operating conditions, and

the processor comprises a control strategy a) for processing data values of various parameters to develop a data value representing a desired ICP set-point, b) for processing the desired ICP set-point data value and a data value representing actual ICP to develop an ICP error data value for closed-loop control of actual ICP, c) for selecting a data value of closed-loop gain from the map based on the data values of certain operating conditions obtained from measurements of those operating conditions, d) for processing both the selected data value of closed-loop gain and the ICP error data value to create a data value for a closed-loop output, and e) and for using the data value for the closed-loop output to create a data value for a final output for forcing actual ICP to the desired ICP set-point.

2. An engine as set forth in Claim 1 wherein the processor comprises strategy for processing the ICP error data through both a proportional function and an integral function using a respective data value of closed-loop gain from the schedule for each of the proportional and integral functions and

for using respective data values resulting from processing of the ICP error data by the respective proportional and integral functions to create the data value for the closed-loop output.

3. An engine as set forth in Claim 2 wherein the processor comprises strategy for developing a data value for a feed-forward, open-loop output approximating the desired ICP set-point and for using the feed-forward, open-loop output data value in conjunction with the data value for the closed-loop output to create the data value for the final output.

4. An engine as set forth in Claim 3 wherein the control system comprises an additional map containing feed-forward ICP set-point data values, each of which is correlated with both a particular data value for a first operating condition within a range of data values for that first operating condition and a particular data value for a second operating condition within a range of data values for that second operating condition, and the processor comprises strategy for selecting one of the feed-forward ICP set-point data values from the additional map on the basis of a data value for the first operating condition and of a data value for the second operating condition, and for then using the one selected feed-forward ICP set-point data value in conjunction with the data value for the closed-loop output to create the data value for the final output.

5. An engine as set forth in Claim 4 wherein the additional map contains feed-forward ICP set-point data values, each of which is correlated with both a particular data value for engine speed within a range of data

values for engine speed and a particular data value for desired engine fueling within a range of data values for desired engine fueling, and the processor comprises strategy for selecting one of the feed-forward ICP set-point data values from the additional map on the basis of a data value for engine speed and of a data value for desired engine fueling, and for then using the one selected feed-forward ICP set-point data value in conjunction with the data value for the closed-loop output to create the data value for the final output.

6. An engine as set forth in Claim 1 wherein the processor comprises strategy for developing a feed-forward data value approximating the desired ICP set-point and for using the feed-forward data value approximating the desired ICP set-point in conjunction with the data value for the closed-loop output to create the data value for the final output.

7. An engine as set forth in Claim 1 wherein the processor comprises strategy for processing a data value representing desired engine fueling, a data value representing a measurement of engine speed, the data value obtained from measurement of engine temperature, and a data value obtained from measurement of barometric pressure to develop the ICP set-point data value representing the desired ICP set-point.

8. An engine as set forth in Claim 1 wherein the control system map provides a schedule that correlates data values of closed-loop gain with data values for both engine speed and engine temperature, and the processor comprises a control strategy for selecting a data value of closed-loop gain

from the map based on the data values for both engine speed and engine temperature.

9. A system for control of injection control pressure (ICP) that is used to force the injection of fuel into an engine combustion chamber comprising:

a processor a) for processing data values of various parameters to develop a data value representing a desired ICP set-point, b) for processing the desired ICP set-point data value and a data value representing actual ICP to develop an ICP error data value for closed-loop control of actual ICP, c) for selecting, from a map that provides a schedule that correlates data values of closed-loop gain with data values for certain operating conditions, a data value of closed-loop gain based on the data values for those operating conditions, d) for processing both the selected data value of closed-loop gain and the ICP error data value to create a data value for a closed-loop output, and e) and for using the data value for the closed-loop output to create a data value for a final output for forcing actual ICP to the desired ICP set-point.

10. A system as set forth in Claim 9 wherein the processor comprises strategy for processing the ICP error data through both a proportional function and an integral function using a respective data value of closed-loop gain from the schedule for each of the proportional and integral functions and for using respective data values resulting from processing of the ICP error data by the respective proportional and integral functions to create the data value for the closed-loop output.

11. A system as set forth in Claim 10 wherein the processor comprises strategy for developing a data value for a feed-forward, open-loop output approximating the desired ICP set-point and for using the feed-forward, open-loop output data value in conjunction with the data value for the closed-loop output to create the data value for the final output.

12. A system as set forth in Claim 11 the processor comprises strategy for selecting, from an additional map containing feed-forward ICP set-point data values, each of which is correlated with both a data value for a first operating condition within a range of data values for that first operating condition and a data value for a second operating condition within a range of data values for that second operating condition, one of the feed-forward ICP set-point data values on the basis of a data value for the first operating condition and of a data value for the second operating condition, and for then using the one selected feed-forward ICP set-point data value in conjunction with the data value for the closed-loop output to create the data value for the final output.

13. A system as set forth in Claim 12 wherein the additional map contains feed-forward ICP set-point data values, each of which is correlated with both a particular data value for engine speed within a range of data values for engine speed and a particular data value for desired engine fueling within a range of data values for desired engine fueling, and the processor comprises strategy for selecting one of the feed-forward ICP set-point data values from the additional map on the basis of a data value for engine speed and of a data value for desired engine fueling, and for then using the one

selected feed-forward ICP set-point data value in conjunction with the data value for the closed-loop output to create the data value for the final output.

14. A system as set forth in Claim 9 wherein the processor comprises strategy for developing a feed-forward data value approximating the desired ICP set-point and for using the feed-forward data value approximating the desired ICP set-point in conjunction with the data value for the closed-loop output to create the data value for the final output.

15. A system as set forth in Claim 9 wherein the processor comprises strategy for processing a data value representing desired engine fueling, a data value representing a measurement of engine speed, the data value obtained from the measurement of engine temperature, and a data value obtained from a measurement of barometric pressure to develop the ICP set-point data value representing the desired ICP set-point.

16. A system as set forth in Claim 9 wherein the map provides a schedule that correlates data values of closed-loop gain with data values for both engine speed and engine temperature, and the processor selects a data value of closed-loop gain from the map based on the data values for both engine speed and engine temperature.

17. A method for control of injection control pressure (ICP) that is used to force the injection of fuel into an engine combustion chamber comprising:

a) processing data values of various parameters to develop a data value representing a desired ICP set-point, b) processing the desired ICP set-point data value and a data value representing actual ICP to develop an ICP error data value for closed-loop control of actual ICP, c) selecting, from a map that provides a schedule that correlates data values of closed-loop gain with data values for certain operating conditions, a data value of closed-loop gain based on the data values for those certain operating conditions, d) processing both the selected data value of closed-loop gain and the ICP error data value to create a data value for a closed-loop output, and e) and using the data value for the closed-loop output to create a data value for a final output for forcing actual ICP to the desired ICP set-point.

18. A method as set forth in Claim 17 wherein the step of processing both the selected data value of closed-loop gain and the ICP error data value to create a data value for a closed-loop output comprises processing the ICP error data through both a proportional function and an integral function using a respective data value of closed-loop gain from the schedule for each of the proportional and integral functions and using respective data values resulting from processing of the ICP error data by the respective proportional and integral functions to create the data value for the closed-loop output.

19. A method as set forth in Claim 17 including developing a data value for a feed-forward, open-loop output approximating the desired ICP set-point and using the feed-forward, open-loop output data value in conjunction with the data value for the closed-loop output to create the data value for the final output.

20. A method as set forth in Claim 19 including selecting, from an additional map containing feed-forward ICP set-point data values, each of which is correlated with both a particular data value for a first operating condition within a range of data values for that first operating condition and a particular data value for a second operating condition within a range of data values for that second operating condition, one of the feed-forward ICP set-point data values on the basis of a data value for the first operating condition and of a data value for the second operating condition, and then using the one selected feed-forward ICP set-point data value in conjunction with the data value for the closed-loop output to create the data value for the final output.

21. A method as set forth in Claim 17 including developing a feed-forward data value approximating the desired ICP set-point and using the feed-forward data value approximating the desired ICP set-point in conjunction with the data value for the closed-loop output to create the data value for the final output.

22. A method as set forth in Claim 17 including processing a data value representing desired engine fueling, a data value representing a measurement of engine speed, the data value obtained from measurement of engine temperature, and a data value obtained from measurement of barometric pressure to develop the ICP set-point data value representing the desired ICP set-point.

23. A method as set forth in Claim 17 wherein the map provides a schedule that correlates data values of closed-loop gain with data values for both engine speed and engine temperature, and the step of selecting a data value of closed-loop gain from the map comprises selecting a data value of closed-loop gain on the basis of data values for both engine speed and engine temperature.